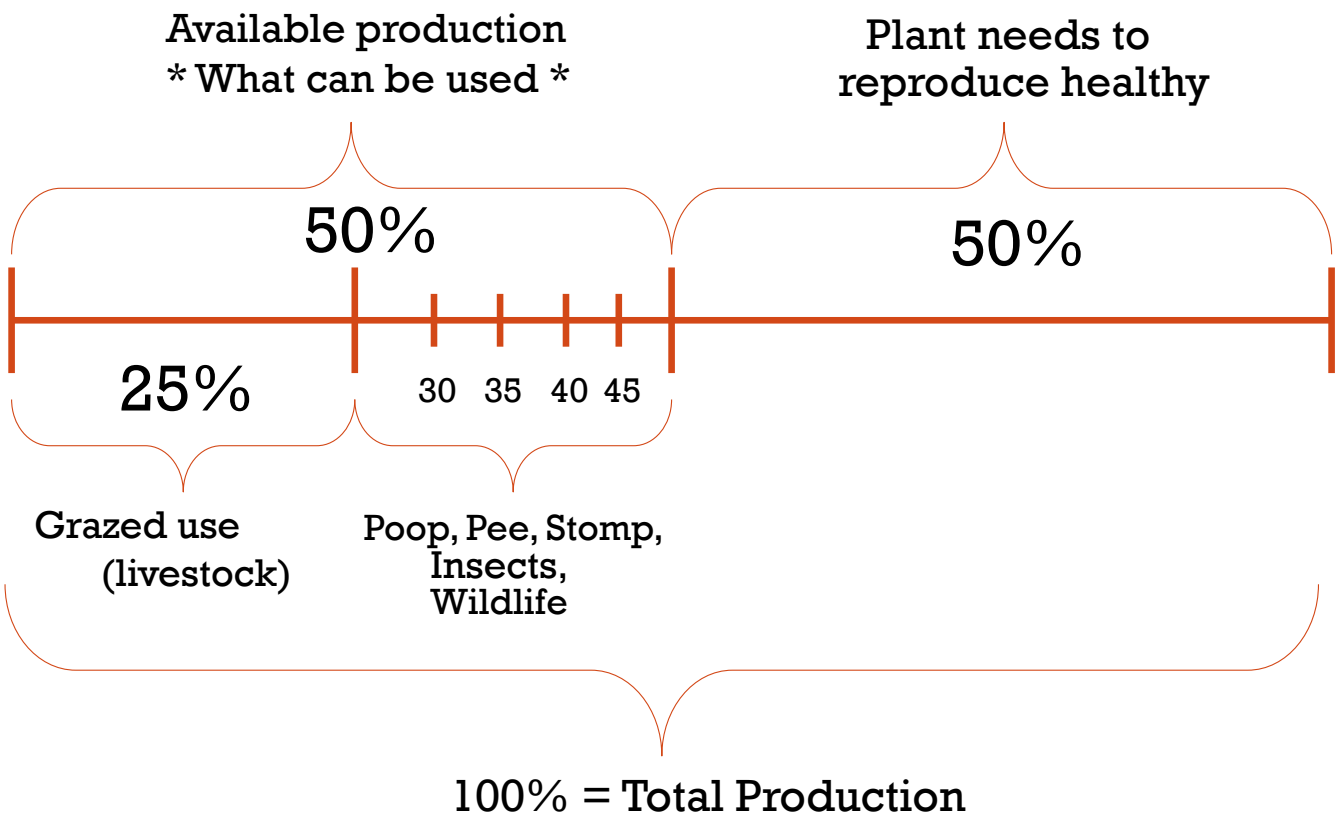
COVER CROPS, GRAZING MANAGEMENT

NATURAL RESOURCES CONSERVATION SERVICE

MANAGING GRASS BY GROWING POINTS

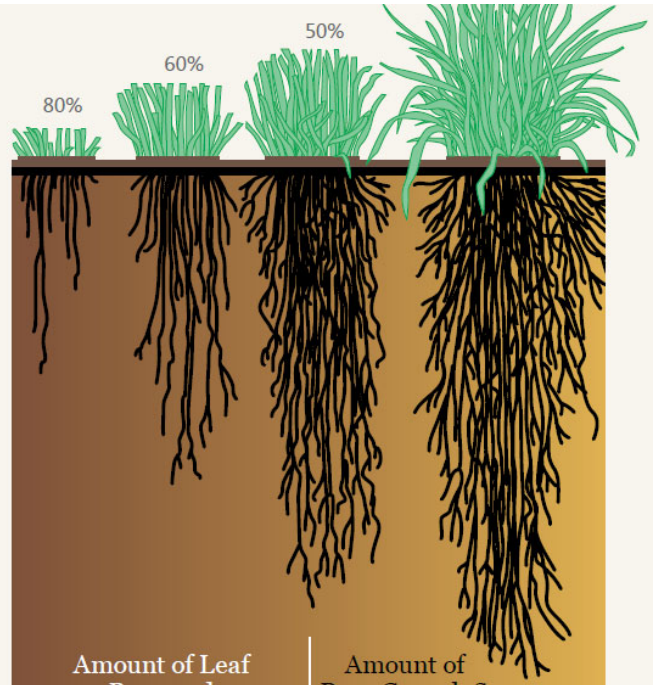
- When the growing point is removed, new lateral buds must develop to produce new leaves.
- This delays above-ground regrowth and may stop root growth.
- When grazed in the vegetative phase this encourages tillering near the buds allowing plants to cover more basal area filling pastures.
- Overall the goal in grazing management is to align plant demands which if utilized correctly can maximize animal weight gains and profits.

NRCS 50-50% RULE OF THUMB FOR RANGELAND



BASICS OF GRAZING MANAGEMENT

- Stocking rate
  - The number of animals on a given area of land over a certain period of time
- Livestock rotation
  - Rotation includes managing when you graze, how long you graze, and how long you allow the area that is grazed to rest and recover before the area is grazed again
- Utilization rate
  - Refers to the grazing intensity
  - Often described as how heavily an area is grazed
- Plant rest and recovery
  - Allow for rest and recovery of your grasses and you will be rewarded with higher producing pastures and healthier, faster-gaining animals



Amount of Leaf Removed	Amount of Root Growth Stoppage
10-40%	0%
50%	2-4%
60%	50%
70%	78%
80-90%	100%

TYPICAL STOCKING RATES FOR OUR AREA

Forage Available

- Rangeland
  - Typical forage can produce 1,000 lbs/acre
  - Taking only 25% - 50% ~ Harvest Efficiency
  - Math – 1,000 lbs/ac *0.25 HE / 912.5 lbs = 0.27 AUM's/ac
  - 1 ac /0.27 AUM's/ac = 3.7 acres per AUM at 25% HE, 1.8 acres per AUM at 50%
- Pastureland
  - Typically forage can produce 2,000 lbs/acre
  - Taking only 25% - 50% ~ Harvest Efficiency
  - Math – 2,000 lbs/ac * 0.25 HE / 912.5 lbs = 0.55 AUM's/ac
  - 1 ac /0.55 AUM's/ac = 1.8 acres per AUM at 25% HE, 0.9 acres per AUM at 50%

Forage Demand

AU—Animal Unit *is equivalent to one 1000-pound cow.*

AUM—Animal Unit Month *is the amount of forage necessary to carry one Animal Unit (AU) for one month.*

AUMs/AC— *Animal Unit Months per acre*

Animal Unit Equivalents (AUEs)

Weight Cow or Cow/Calf Pair (Assuming a 1000# cow) = 1.0
Ewe = 0.15
Bull (1800#) = 1.8
Lamb (12 Months) = 0.1
Weaned Calf (500#) = 0.5
Ram = 0.2
Heifer/Steer (13-18 Months or 700-900#) = 0.7 - 0.9
Goat = 0.15
Heifer/Steer (19-24 Months or 900-1100#) = 0.9 - 1.1
Other Animals = 0.1 AU for Each 100# of Body

USING PLANT HEIGHT TO DETERMINE WHEN TO MOVE AND HOW LONG TO REST

Plant Species	Minimum Plant Height (inches)	
	Pasture turnout acceptable	Remove animals and rest pasture
Alfalfa	6 – 10	3 – 4
Brome, smooth	5 – 8	3 – 4
Fescue, Tall	5 – 8	3 – 5
Fescue, Creeping Meadow	5 – 10	3 – 5
Kentucky Bluegrass	3 – 5	2 – 4
Orchardgrass	5 – 8	3 – 5
Sideoats, Grama	4 – 5	2 – 4
Switchgrass	8 – 10	6 – 8
Timothy	4 – 6	2 – 4
Wheatgrass, Crested	4 – 6	2 – 4
Wheatgrass, Intermediate	5 – 8	3 – 5
Wheatgrass, Pubescent	5 – 8	3 – 5
Wheatgrass, Western	5 – 8	3 – 5
Wheatgrass, Tall	8 – 12	5 – 8

How long is a pasture allowed to recover after a grazing event?

- Less than 30 days.
    - Dryland pastures in Colorado typically need more than 30 days to regrow after grazing.
- Depends on the time of year, grass growth cycle, and precipitation received.
- 30-45 days is recommended during the fast growth period (typically May and June in Colorado). Drought conditions will extend regrowth time.
- 60-90 days is recommended during the slow growth period (typically July to October in Colorado). Drought conditions will extend regrowth time

TOOLS TO HELP WITH GRAZING MANAGEMENT

GRAZING MANAGEMENT TOOLS – TIMED GATE RELEASE

- Batt-Latch – Timed gate release
- Great for remote locations
- More efficient use of time and labor on
- Solar Powered
- Rugged and waterproof
- Stock move on their own time into the new pasture

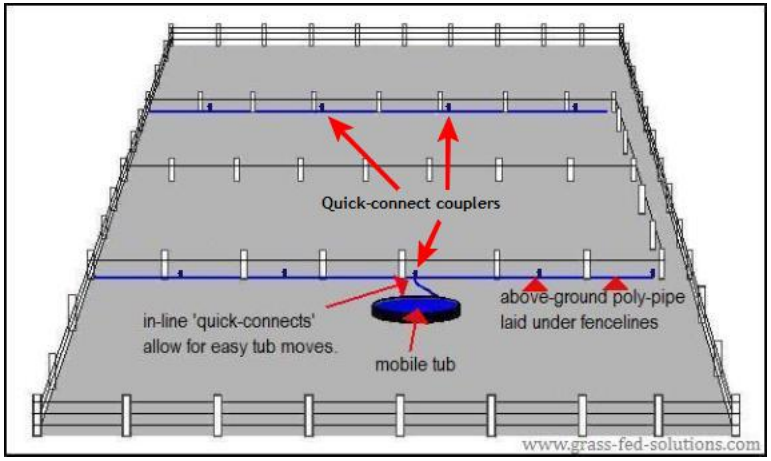
TYPICAL RANGE AND PASTURE IMPROVEMENTS

GRAZING MANAGEMENT TOOLS – PORTABLE TANKS

Plusson – Quick Connect allows for easy movement of stocktank and stockwater

Up to 140 PSI rating

Developed in Australia



GRAZING MANAGEMENT TOOL RESOURCES

- Battlatch - https://www.americangrazinglands.com/products/batt-latch-gate-release-timer
- https://msffarm.com/fence-products/batt-latch.htm
  - $395
- Plasson Quick Connect Coupler for Temporary movable stockwater
  - https://www.youtube.com/watch?v=kczaxzMFO-A
  - https://www.americangrazinglands.com/products/quick-coupler-valve-3-4
  - $10.95 – single Quick-Coupler

MONITORING TOOLS – LIVESTOCK NUTRITION AND FORAGE QUALITY

- NUTBAL
  - Fecal analysis to determine
    - Quality of the grass or hay consumed 36 hr prior to defecating
    - % crude protein(CP) - Forage crude protein levels below 6 to 8%, forage intake decreases
    - % digestible organic matter (DOM) – measure of energy as in total digestible nutrients Less than 66% feed
    - Fecal nitrogen (FN) and Fecal phosphorus – FN and FP refer to the proportion of these minerals in the manure
      - Good analysis of N and P levels going back into soils
    - Analysis includes a CP/DM to look at ruminant efficiency
    - Analysis includes trend analysis of expected BCS if on the same feed
  - Really good analysis of feed quality if you are considering the most cost effective supplements that may be needed for your livestock goals
  - NUTBAL allows managers to assess a problem, formulate a solution, and move on to other pressing issues
  - Cost - $45 per fecal sample or $80 for advisor report
    - Shipping will usually be around $15-20 for 3 day priority
    - One fecal sample can represent an entire herd
  - To start call GANLAB to setup an account and get free kit sent over

Texas A&M
Center for Natural Resource Information Technology
Blackland Research & Extension Center
720 E. Blackland Road
Temple, TX 76502
Phone: 254.774.6134
Fax: 254.774.6150

GRAZING MONITORING TOOLS AND SERVICES OFFERED BY NRCS

- Monitoring Methods
  - Stubble Height
  - Rangeland Health
  - Utilization
  - Proper functioning condition
  - Pastures Condition Score
  - Productivity (pre-grazing forage)
  - Residual (post-grazing forage)
  - Nutrition (fecal analysis with NUTBAL)
  - Grazing Response Index
  - Streambank alteration (hoof shearing)
  - Permanent photo plots
  - Composition by annual production
  - Composition (greenline)
  - Structure and/or age class
  - Cover – foliar and ground • Frequency
  - Gap
  - Density
  - Soil stability
  - Streamside stability (for riparian)
  - Stream metrics (i.e. width, depth, substrate)

EXAMPLE OF UTILIZATION CAGES

- T-3
- Post Grazing Season – 10/10/18

- Post Grazing Season – 11/5/19

AUM'S SUPPLY/DEMAND SUMMARY BY PASTURE

Estimated Total AUM's of Forage Available – 2022

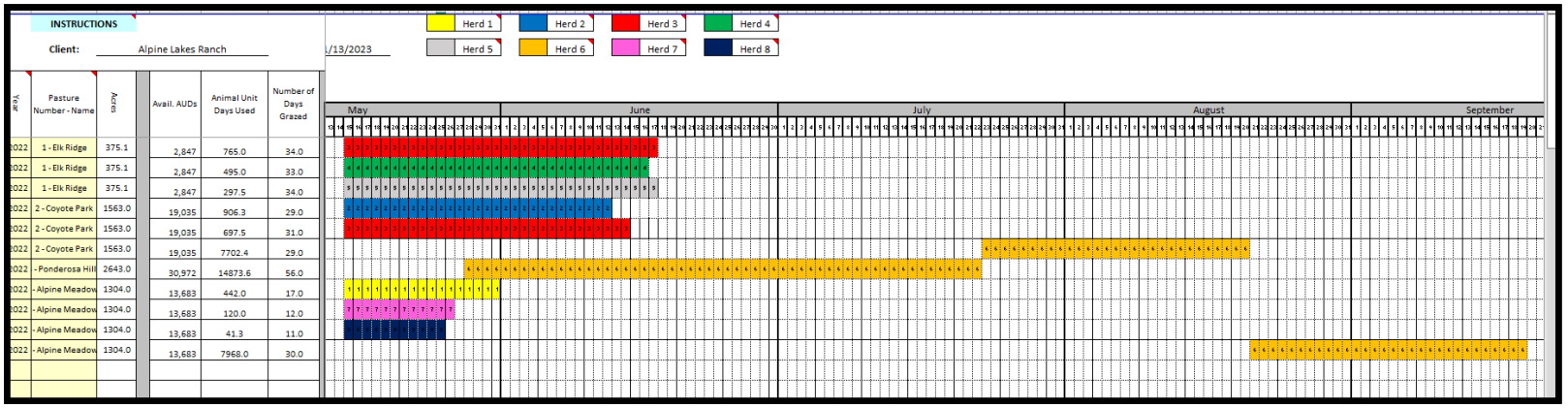
- 2,609 AUM's with 0.25 utilization or leaving over 75% of available grass for plant health and seasonal losses

Estimated Total AUM's Demand

- 8-26 Cow/calf Pair - May 15th to June 17th (1 month grazed)
- 332 Yearlings - May 28th to September 19th (4 months grazed)

Estimated Season of use

- May to September (1 to 4 months grazed)

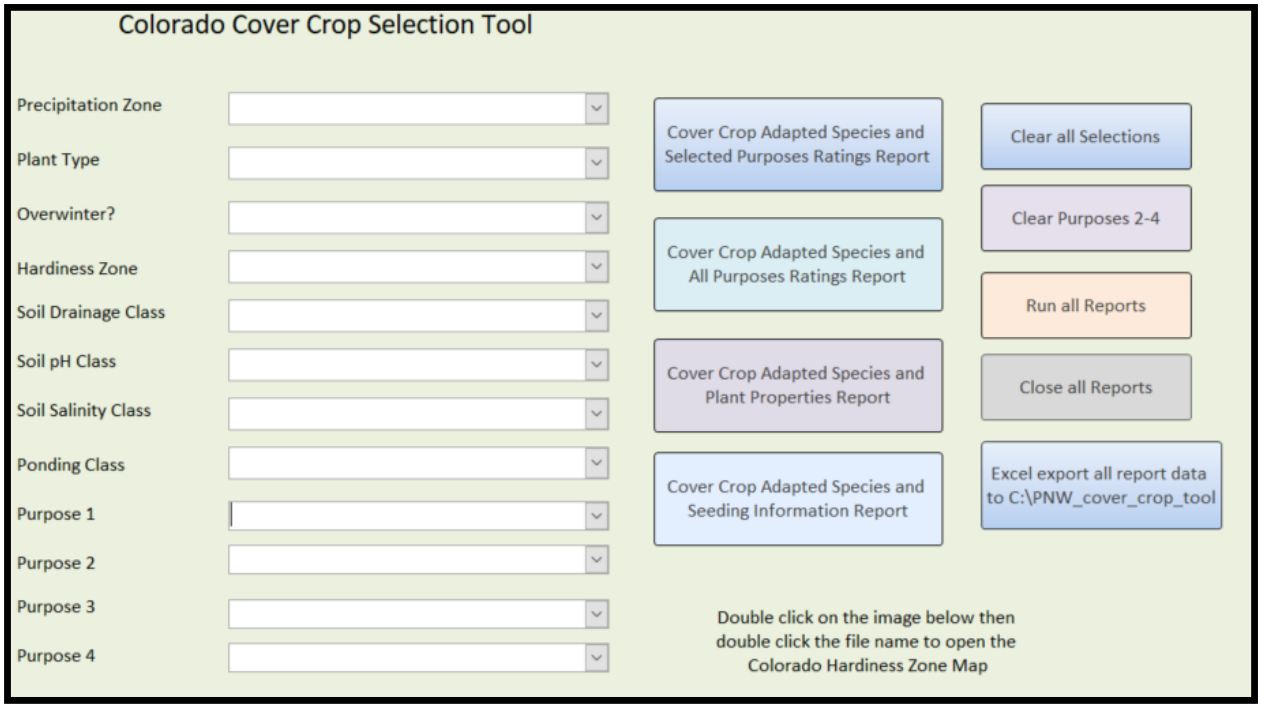


ALR Grazing Unit	Acres	Available AUM's @ 0.25 HE	Available AUD's @ 0.25 HE	AUD's Used	Number of Days Grazed	% grazed based on AUD's used and season of use	% grazed based off Utilization cages
Elk Ridge	1,925	486	2,847	1,557	34-35 days	45%	13-26%
Ponderosa Hill	2,642	1,032	30,972	14,873	56 days	52%	27-47%
Coyote Park	1,563	634	19,035	9,306	29 – 31 days	51%	48-49%
Alpine Meadows	1,304	456	1,304	8,565.30	11 – 30 days	>100%	41-53%

COVER CROPS

COVER CROP SELECTION TOOLS

- Design Seed mixes to the purposes of Cover Crop
  - Erosion Control
  - Increase Organic Matter
  - Capture, recycle, redistribute nutrients
  - Promote nitrogen fixation
  - Weed Suppression
  - Soil-borne pest suppression
  - Provide supplemental hay
  - Provide supplemental grazing
  - Minimize or reduce soil compaction
  - Attract beneficial insects

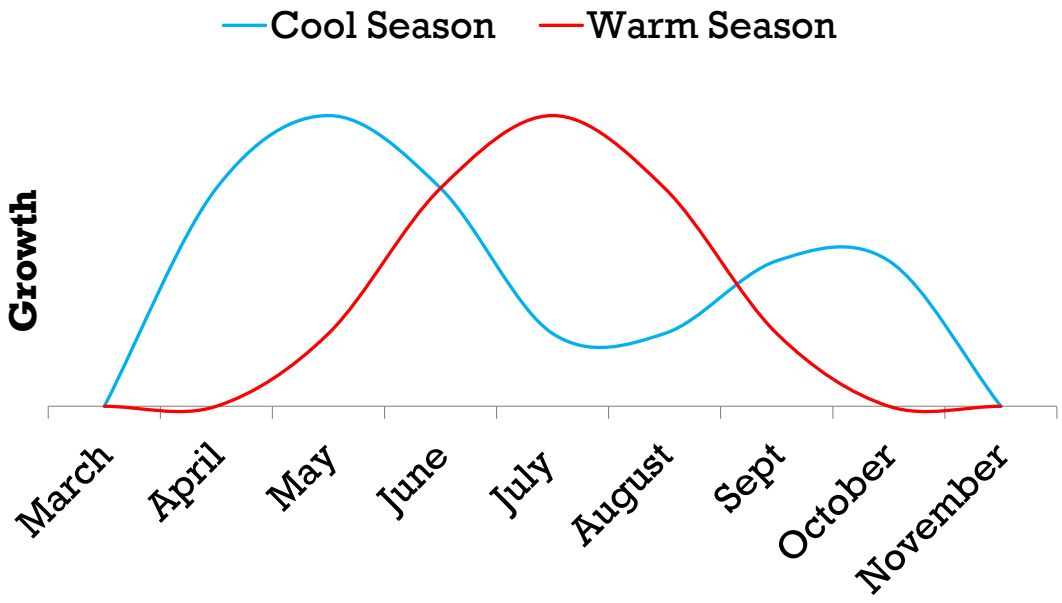


CARBON TO NITROGEN RATIO PLANNING WITH COVER CROPS

- C:N ratio is the mass of Carbon to the mass of Nitrogen
- Optimum ratio is 24:1
- As a rule of thumb, the higher the ratio, the longer it takes for the material to decompose
- Likewise, the smaller the ratio is, the more rapidly the plant material will decompose.

Material	C:N Ratio
Rye Straw	82:1
Wheat Straw	80:1
Oat Straw	70:1
Sorghum-Sudan Grass	63:3
Crimson Clover	21.2
Annual Ryegrass	20.5
Rotted Barnyard Manure	20:1
Hairy Vetch Cover Crop	11:1
Alfalfa	11:3
Ideal Microbial Diet	24:1

WARM SEASON VS COOL SEASON PLANTS



Perennial Shrubland/Grassland Plant Species Composition

Grass/Grasslike

Group	Group name	Common name	Symbol	Scientific name	Annual Production (pounds per acre) Low	High
1	-Native Cool Season Bunchgrasses				400	700
		Grass, perennial	2GP		0	50
		Indian ricegrass	ACHY	*Achnatherum hymenoides*	10	100
		squirreltail	ELEL5	*Elymus elymoides*	5	50
		needle and thread	HECO26	*Hesperostipa comata*	10	100
		prairie Junegrass	KOMA	*Koeleria macrantha*	0	20
		muttongrass	POFE	*Poa fendleriana*	400	600
2	-Native Cool Season Rhizomatous Grasses				150	450
		western wheatgrass	PASM	*Pascopyrum smithii*	150	450
3	-Native Warm Season Rhizomatous Grasses				0	25
		blue grama	BOGR2	*Bouteloua gracilis*	0	15
		James' galleta	PLJA	*Pleuraphis jamesii*	0	15

Sutherland's Periodic Table of Annual Cover Crops

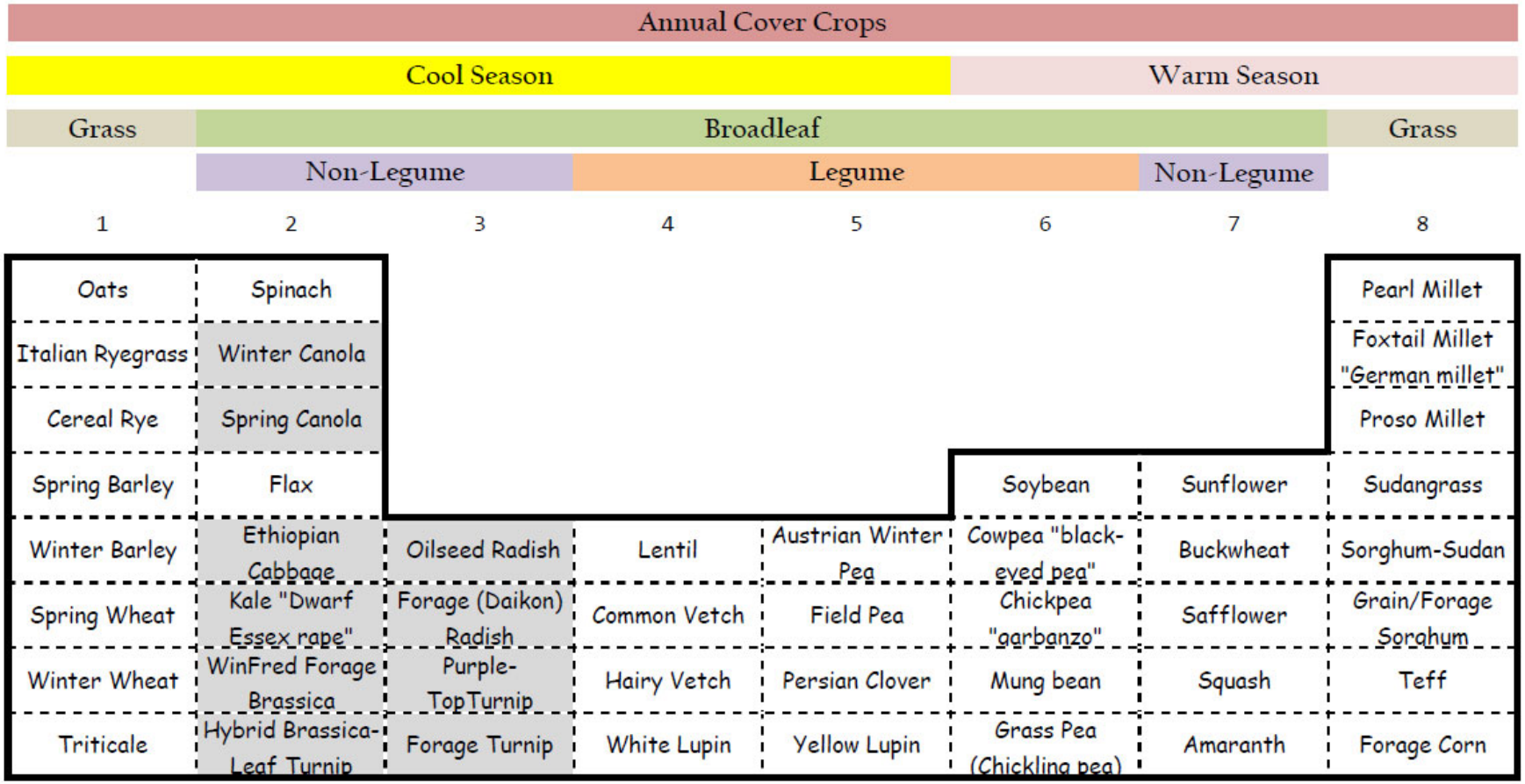


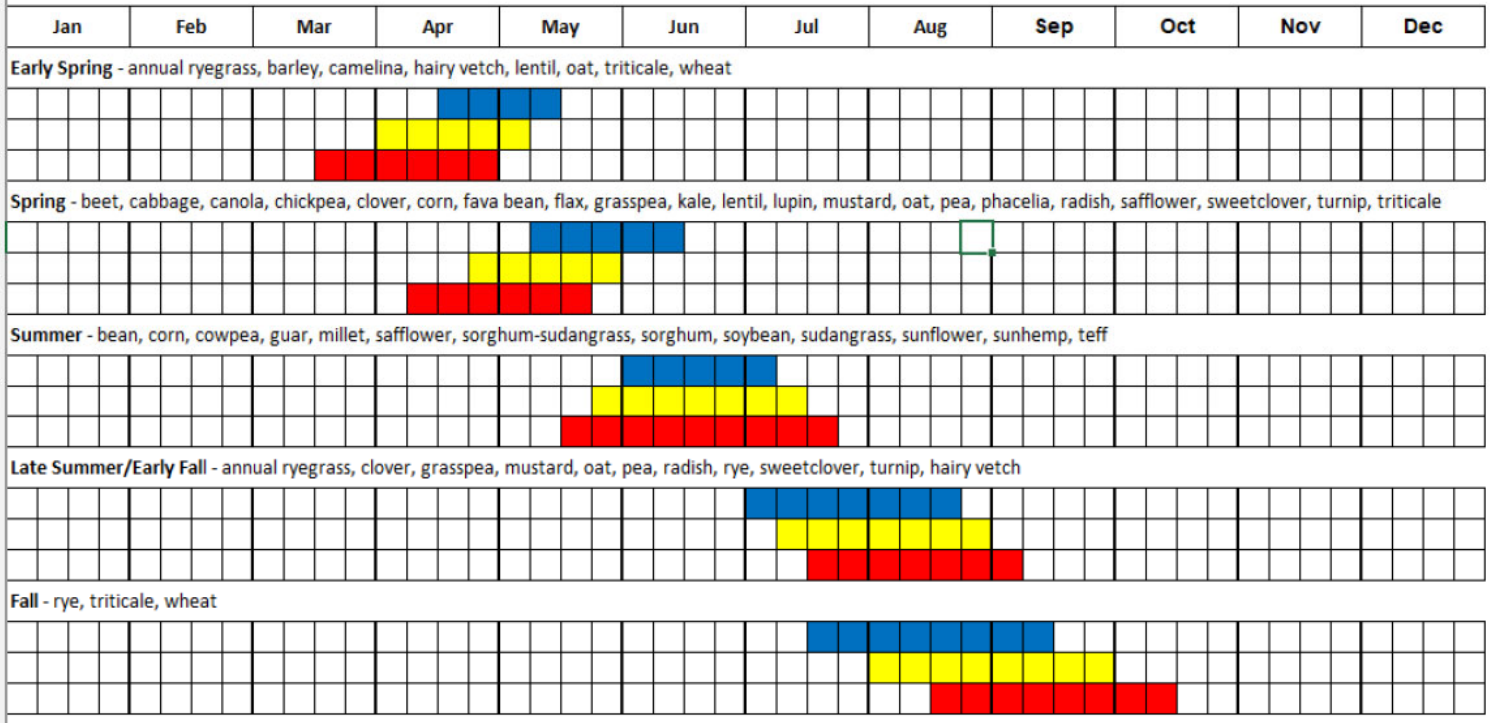
Table Notes:

1. Shading represents Brassica species
2. Column 2; cool-season, non-legume "leafy" species
3, Column 3; cool-eason, non-legume "root" species

USDA United States Department of Agriculture

Seeding Timeframe

Suggesteded Cover Crop Seeding Periods by Median Freeze Free Period (32° F) and Major Land Resource Area (MLRA) within Colorado



Data Sources: NOAA Regional Climate Centers - Agricultural Applied Climate Information System (AgACI: (http://www.rcc-acis.org/
USDA Handbook 296, 2006, Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin
(http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_050898.pdf)

FFP	MLRA	Median	Low	High
<91	48B	52	37	84
	48A	83	37	138
91 - 120	34A	104	84	111

FFP	MLRA	Median	Low	High
121 - 180	36	128	108	143
	49	136	107	149
	67B N	140	120	154

340 Implementation Requirements | Cover Crop Table | Suggested Seeding Periods | Freeze Free Periods

COOL SEASON GRASSES

- Annual Ryegrass
- Cereal Rye
- Barley
- Oats
- Wheat
- Triticale

Spring Oats

Cereal Rye

WARM SEASON GRASSES

- Pearl Millet
- German Foxtail Millet
- Sorghum-Sudan grass
- Forage Sorghum
- Teff

Brown rib sorghum - sudan grass

Pearl Millet

COOL SEASON BROADLEAF

- Radish
- Turnip and Rape
- Kale and Collards
- Mustard
- Phacelia

WARM SEASON BROADLEAF

- Safflower
- Sunflower

MIXES FOR INTENDED PURPOSES

- Increase Organic Matter
  - Sorghum Sudan, Spring Barley, Annual Ryegrass, Pearl Millet, Spring Triticale, Spring Wheat
- Promote Nitrogen Fixation
  - Chickpea, Cowpeas, Medics, Vetch's
- Suppress Weeds
  - Spring Barley, Spring Triticale, Spring Wheat, Turnips, Sorghum Sudan, Cowpea's, Fenugeek, Vetch's
- Provide Supplemental Grazing
  - Sugar Beets, Sorghum Sudan, Chickpea, Fenugeek, Kale, Sunflower, Turnips
- Erosion Reduction
  - Spring Triticale, Spring Barley, Spring Wheat, Sorghum Sudan, Chickpeas, Fenugreek, Pearl Millet, Annual Ryegrass

SEED COSTS AND AVAILABILITY

- Basin Co-op – Spring Cover crop mix – $1/lb
  - Spring oats, field peas, radish, turnips
  - (970) 247-3066
  - 26103 Hwy. 160E, Durango, CO 81301
- Southwest Seed
  - swseed@southwestseed.com
  - Ph: 970.565.8722
  - 13514 County Road 29
  - Dolores, CO 81323-9356
- Pawnee Buttes Seed
  - 605 25th St., Greeley, Colorado
  - Office: (970) 356-7002
  - Toll Free: (800) 782-5947
- Green Cover - custom cover crop mixes
  - https://greencover.com/
- Granite Seed
  - https://graniteseed.com/
  - 9>5%Jfxy&:ym&F{j3&Zsny&F Ijs{jw&Htq&twfit&=577><7539>;35;55

HOW TO TEST FOR SOIL HEALTH

WHAT IS THE NUTRIENT CONTENT OF YOUR SOIL CURRENTLY ?

- CSU extension Soils test - $35
  - pH, EC, organic matter, nitrate, phosphorus potassium, zinc, iron, copper, manganese, boron and lime & texture estimates
- CSU Manure, Compost, and Potting Soil Analysis (For soil amendments only) - $48 per sample
  - pH, EC, organic matter, ammonium, nitrate, phosphorus, potassium, zinc, iron, copper, manganese, % lime, dry matter, C:N ratio, Total N)
- NRCS soil health bucket – Free
  - Soil texture, pH, nitrate, phosphate and potassium, organic matter, bulk density, infiltration, water content, porosity, respiration, aggregate stability, roots and pores, Solvita soil health test,
- Ward Laboratories Inc - $50-60 - Kearney, NE - (800) 887-7645 - https://www.wardlab.com/contact.php
  - $50 - The Haney Test - This test examines total organic carbon and total organic nitrogen to determine a C:N ratio used to make general cover crop recommendations. This test also includes a 24 hour CO_2 soil respiration test to look at microbial biomass and potentially mineralizable nitrogen.
  - $60 - PLFA – Test Soil biological testing at Ward Laboratories is conducted by analyzing phospholipid fatty acids, or PLFA. PLFA gives a representation of living soil microbial biomass and allows us to identify the presence or absence of various functional groups of interest through known PLFA biomarkers. PLFA is a snapshot of soil community structure and abundance at the time of sampling. As environmental conditions such as temperature and moisture change so does the microbial community. This ability of the soil microbial community to change provides producers with a tool to compare agricultural management techniques with respect to overall better microbial community health.
- Web Soil Survey - https://websoilsurvey.nrcs.usda.gov Free – soil characteristics and more

NRCS PROGRAMS AND OFFICE

- EQIP – Environmental Quality Incentive Program
- CSP – Conservation Stewardship Program
- ACEP – Agricultural Conservation Easement Program
- Technical Assistance
- Office location – 31 Suttle Street in Bodo Park, Next to FedEx building
- (970) 259-3289 ext 3